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Superintendent C. G. Thomson
Yosemite National Park,
California

Sir:

I have the honor to submit the following report on the insect control activities of the fall of 1933 and the spring of 1934.

Respectfully submitted,

Emil Ernst

Emil Ernst,
Ranger-Forester.

Triplicate

SUMMARY OF REPORT ON INSECT CONTROL, SPRING 1934

The Fall of 1933 and the Spring of 1934 Insect Control program was financed by an ERA appropriation of $25,000.00 for work on Park lands. Cooperative work on Forest Service and private lands outside of the Park was financed by the Forest Service. Approximately $1500.00 was supplied by the Sierra National Forest and approximately $5,200.00 was made available by the Stanislaus National Forest.

Lands within the control program area formed a belt 3 miles wide extending from the Wawona Basin and Rush Creek to the Middle Fork of the Tuolumne River. A tongue extended from there to Hetch Hetchy. Nearly all of the Sugar and Ponderosa Pine type stands of the Park were inspected systematically for infested trees.

In the total of 46,951.94 acres treated by the Park insect control organization 10,634.39 acres were Stanislaus National Forest cooperative lands; 5,609.17 acres were Sierra National Forest cooperative lands; and 1,365 acres were private lands within the boundaries of the Park. The private lands were treated without cost to the owners, the object being not to leave islands of infestation within the treated areas on account of the inability of the private owners to finance control operations on their own lands. It is estimated that 80,000 acres were given protection.

Inventories do not exist for the lands within the Park. Estimates place the volume of timber involved in the control operations at 2 billion board feet at the least, some of which is very beautiful Sugar Pine.

The insects responsible for the bulk of the losses were the Western Pine Beetle, the Mountain Pine Beetle, the Jeffrey Pine Beetle, various Engraver Beetles, and in the Douglas Fir the Hemlock Bark Borer.

Losses in the Sugar Pine were considerably less than a year ago for the over-wintering generation. In 1933, 7,986,820 board feet, and in 1934 2,127,040 board feet of Sugar Pine were treated on approximately the same lands. Losses in the Ponderosa Pine were considerably less than last year with the exception of the as yet untreated lands in the Miguel Meadows region where an infestation has been developing in the last year. Flatheaded Borer attacks were more noticeable this year than last and a campaign was carried out against the Hemlock Bark Borer, a Flathead, in the Douglas Fir.

The insect control program being reported on is a part of the main insect control program started in the Spring of 1932. At that time a comprehensive and systematic program was laid out with the object of keeping the heavy losses from insect attacks as low as possible. In the main this spring's work was maintenance work on the lands previously treated by the

Park Service; however, new control areas were involved in the adjoining Forest Service and private lands in the Rockefeller Purchase region. To protect the Rockefeller Purchase lands adequately it was necessary to have the cooperation of the Forest Service and the private owners on the adjoining infested lands. In the recent history of insect control work in the Park this cooperative control was the outstanding feature.

Technical advice as in the past was obtained from the Bureau of Entomology thru Senior Entomologist John M. Miller's representative, John. E. Patterson, who was also in charge of the insect control program on the Stanislaus Forest. All of the cooperative work between the Forest Service and the National Park Service was of the best possible character.

Cooperation between the various Yosemite National Park departments was also of the best character. Were it not for this cooperation it would not have been possible, because of the higher costs prevailing under NRA appropriations, to keep the unit costs as low as they eventually were. The specialized advice of the other departments of the Park saved considerable time and money.

With the exception of placing all Forest Protection activities under John H. Wegner, Assistant Chief Ranger, no change was made in the insect control organization from last year. Ranger-Forester Emil F. Ernst was in charge of the technical side and Foreman William Mayhall was in charge of the work in the woods, i.e., the actual treating.

Two camps were constructed for winter occupancy at North Crane Creek and at Ackerson Meadows. These camps were constructed as well as possible for heavy winter conditions and the men were well taken care of with warm, comfortable tent cabins, hot water, shower baths and washing facilities. One of these camps has been in continuous use since construction by insect control and trail construction crews. Use was made of the main headquarters camp in Yosemite Valley and a crew of treaters worked out of Camp A. E. Wood near Wawona. The tent camp at Big Meadows was reinstalled to take care of the Big Meadows unit.

The rather open winter was followed by a long dry spring in which precautions had to be taken to prevent treating fires from getting away. Four fires, the largest of which was not over 2 acres in size, were combatted by the insect control crews. Only one of these fires was on Park land and one of the remaining three was on an area treated by the Forest Service crews.

The most radical change in the insect control organization from last year was the large increase in the wages of the men and the reduction in hours to keep within the 40-hour-week limit set in NRA appropriations. The following is the schedule of wages set by the NRA:

General foreman...	$ 200.00 per month	Head spotter.....	$ 1.10 pr Hr.
Camp foreman.....	175.00 per month	Saw filer.....	1.10 pr hr.
Line man.....	175.00 per month	Plumber.....	1.10 per hr.

Line man.....	1.10 per hr	Plumber's Helper.....	.85 per hr
Carpenter.....	1.10 " "	Carpenter's Helper.....	.85 " "
Truck driver.....	.85 " "	Bull cook.....	.60 " "
Loggers (treaters).	.85 " "	Laborer.....	.60 " "
Spotter.....	.85 " "		

The high wages and the necessity of taking men in the neighboring counties helped bring in some unsatisfactory labor that later had to be eliminated. Men claiming to be experienced loggers and woodsmen had to be given a chance to prove themselves and were found in many cases to be woefully inexperienced.

The standard methods of strip and contour spotting were used in the spotting organization. Four-man spotting crews were used in the strip method. Contour spotting was done by two-man parties. Lines were run in cardinal directions and the strips were usually 10 chains wide.

Treating was by burning of the infested bark. Green bark was peeled whenever found and abandoned bark was left on the trees. A considerable amount of treating occurred under snow conditions where there was no necessity to construct fire trenches. Because of the open winter and early spring, however, the bulk of treating was done under rather hazardous fire conditions. Care had to be taken to construct adequate fire lines and the fires had to be closely watched. Even with all the care three small fires occurred in areas treated by the Park insect control organization.

A total of 2,040 trees with a volume of 4,488,670 board feet were treated. Of this total 107 trees with a volume of 359,210 board feet were treated by an ECW stub camp of 25 men stationed at North Crane Creek. The 2040 trees included the following:

Sugar Pine	527 trees	2,127,040 board feet
Ponderosa Pine	1,139 trees	1,769,070 board feet
Jeffrey Pine	97 trees	136,030 board feet
Digger Pine	4 trees	500 board feet
Douglas Fir	373 trees	455,990 board feet

SPOTTING COSTS AND MAN-HOURS SPOTTING

Number of Man-hours spotting, including compassman.....	3,768 hr
Number of man-hours head spotting.....	1,182 "
Total number of man-hours spotting.....	4,950
Volume of trees spotted - excluding Douglas Fir.....	4,031,720 ft
Number of trees spotted - excluding Douglas Fir.....	1,694
Acres spotted.....	46,951.94
Number of trees spotted per man-hour.....	.34
Volume of trees spotted per man-hour, board feet.....	824.60
Acres spotted per man-hour.....	9.48
Cost per tree spotted.....	$2.06
Cost per thousand board feet spotted	0.858

TOTAL BARK SURFACE TREATED AND NUMBER OF INSECTS IN THE BARK DESTROYED

	Ponderosa Pine	Sugar Pine	Jeffrey Pine	Digger Pine	Douglas Fir	Totals
Total Bark Surface (in square feet)	678,938	472,983	53,002	644	153,537	1,359,993
Number of Insects in Brood	136,791,600	94,593,400	10,780,400	128,600	30,705,400	271,998,600

CONCLUSIONS AND RECOMMENDATIONS

The per-acre loss this year is considerably less than last year. The results indicate what can be done with a serious situation if time, experienced men and money are available in the required amounts.

Due to the higher wages paid thru the NRA unit costs were considerably higher than last year. The employment of skilled men under high wage schedules in camp construction is directly reflected in high aggregate treating costs. The 30-hour week does not belong in insect control work because of the rapidity of the development of the beetles. The 40-hour week was a little better but valuable treating-weather time was lost because of the shorter work week. Because of the nature of insect brood development every advantage must be taken of opportunities offered to the treating organization. The shorter work week stretches out the period in which treating is done so much that portions of the treating must be done under very unfavorable fire conditions. Transportation costs were increased 100% helping to raise the unit cost over that of last year.

To sustain the gain that has been obtained against the bark beetle infestation it is recommended that $30,000 be made available thru NRA appropriations (or $25,000 thru regular appropriations) for continuance of insect control activities.

TABULATION OF AVERAGE COSTS

Treating costs only	$14,174.84
Total cost of treating, all categories	$31,618.88
Cost per tree treated, treating costs only	7.33
Cost per tree treated, all categories	16.45
Cost per thousand board feet treated, treating costs only	3.44
Cost per thousand board feet treated, all categories	7.70
Cost per acre treated, treating costs only	0.177
Cost per acre treated, all categories	0.70
Cost per acre protected, all categories	0.397
Cost per man-hour of treating labor	0.864
Cost per thousand feet spotted, spotting costs only	0.888

Number of trees treated per man-hour of treating labor	.11 tree
Volume treated per man-hour of treating labor	231.7 feet
Number of trees treated per man-day (computed from above)	.88 tree
Volume treated per man-day (computed from above)	2013.6 feet
Acres protected	80,000.00 acres

38°00'

T.1 N.

T.1 S.

T.2 S.

R.19 E.

R.20 E.

R.21 E.

R.22 E.

Areas treated,1933-1934.

Introduction

The Fall of 1933 and the Spring of 1934 insect control campaign which came to an end on the 7th of May was financed by an NRA appropriation of $25,000 that became available in early October 1933. It was the understanding at the time that the Park insect control organization would treat a portion of the private and Forest Service lands immediately adjacent to the Park boundaries and it was with this fact in mind that the sum was placed at $25,000. Later developments showed that Park Service appropriations could not be used on lands outside of the Park boundaries and that the Forest Service would finance Park organization activities on the adjoining private and Forest Service lands. Previous to the allocation of the funds a conference of representatives of the Bureau of Entomology, the Stanislaus National Forest, and Yosemite National Park was held in the office of the Superintendent of Yosemite National Park on the 7th of September for the purpose of formulating the plans for the forthcoming control program.

Areas Involved

Within the Park boundaries the insect control program was carried on in a belt averaging 3 miles in width extending from the west boundary of the Mariposa Grove of Big Trees to the Middle Fork of the Tuolumne River. A narrow tongue extended further along the Hetch Hetchy Road to a mile from the Dam. The belt was as much as 6 miles wide in the Carl Inn region due to the addition of many sections of private and Forest Service lands which were treated under a cooperative agreement with the Forest Service. This belt of approximately 80,000 acres contains some of the largest stands of the finest Sugar Pine timber to be found in the possession of the Federal government. All of the major timber types common to the region were encountered in the control program. These types include the lower elevation Woodland grass type, the various Ponderosa Pine types, the various Sugar Pine types, and the Jeffrey Pine type which was encountered mostly in the slopes of Bald Mountain. Usually some amount of infestation was to be found wherever Ponderosa, Sugar and even Jeffrey Pine existed. The limit of elevation was lowered in this campaign to include the 2200 foot level at El Portal. The highest elevation reached was in the Bald Mountain region at approximately 7500 feet above sea level.

Because of topographical and transportation situations the areas involved in the control campaign resolved themselves into 7 distinct entomological units. These units are named from the most prominent feature therein, and are in order of importance.

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1. Yosemite Valley
2. The Wawona Basin
3. The Wawona Road
4. Big Meadows
5. Crane Flat, which includes a sub-unit, the South Fork of the Tuolumne River
6. Ackerson Meadows
7. The Hetch Hetchy road strip

Infestation inspection took place on all of the 80,000 acres within the protected area to determine the necessity for control operations. Actual treating occurred on 46,981.94 acres within and without the Park boundaries. Included within this aggregate area were 1,365 acres of private land within the boundaries of the Park. Last year 1,205 acres of private lands were treated and the difference of 160 acres is to be found in the inclusion of the 160 acres in the Aspen Valley homesite holdings to the control areas. Because of the strained economic conditions and the inability of private landowners to foot control costs, the Park Service assumed the costs of control operations on those lands within the control areas so as not to jeopardize the success of the work on the surrounding Park lands. As the strained economic conditions still existed control work was carried on in private lands again in the same manner. The private lands and their owners are enumerated below:

Township 4 South, Range 21 East, Section 35, many small owners	640 acres
Township 3 South, Range 20 East, Sections 2 and 3, Mrs. Elizabeth Meyer	365 "
Township 3 South, Range 20 East, Sections 2 and 3, many small owners	200 acres
Township 1 South, Range 20 East, Section 28, Hodgdon and Bright	160 acres
	1,365 acres

Of the 46,981.94 acres within the control areas 2,649.17 acres were treated for the Sierra National Forest under a cooperative agreement similar to the one of last year when identically the same areas were treated for this forest. For the same forest and under a similar agreement a small pocket of infestation on 960 acres in the El Portal region was treated which was not treated a year ago. For the Sierra National Forest in all a total of 3,609.17 acres were treated in this control campaign at a cost of $1,442.99 out of an original allotment of $1,500.

Sierra National Forest Lands in the Bishop Creek area.

Township 4 South, Range 21 East

Section 5	139.53 acres
Section 8	278.00 "
Section 17	277.64 "
	695.17 acres

Sierra National Forest lands in the Rush Creek area.

Township 4 South, Range 20 East

Section 25	640.00 acres
Section 36	400.00 "
	1,040.00 acres

Township 4 South, Range 21 East

Section 32	554.00 acres

Township 5 South, Range 21 East

Section 4	160.00 acres
Section 5	200.00 acres
	360.00 acres

Sierra National Forest lands in the El Portal area

Township 3 South, Range 20 East

Section 16	410.00 acres
Section 17	90.00 "
Section 21	200.00 "
Section 22	260.00 "
	960.00 acres

Total for Sierra National Forest . . . . . 3,609.17 acres

Stanislaus National Forest lands in the North Crane Creek area.

Township 2 South, Range 20 East

Section 6 West half	296.63 acres

Township 2 South, Range 19 East

Section 1	641.08 acres
Section 2	642.68 acres
Section 11	640.00 "
Section 12	640.00 "
	2,860.39 acres

In addition to the 3,609.17 acres treated for the Sierra National Forest there were treated on the west side of the Park in the Main cooperative area a total of 10,534.39 acres which are enumerated in the following table.

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Stanislaus National Forest Lands in the Ackerson Meadows area.

Township 1 South, Range 19 East	
Section 1	652.00 acres
Section 12	640.00 "
Section 23	220.00 "
Section 24	640.00 "
Section 25	640.00 "
Section 26	470.00 "
Section 27	20.00 "
Section 35	887.72 "
Section 36	901.40 "
	5,071.12 acres
Township 2 South, Range 19 East	
Section 3	644.36 acres
Section 10	640.00 "
	1,284.36 acres
Township 1 South, Range 20 East	
Section 30	402.40 acres
Section 31	916.12 "
	1,318.52 acres
Total for Stanislaus National Forest	10,534.39 acres

The legal descriptions of the lands treated in this control campaign:

Treated from the Ackerson Meadows Camp

	Acres
Township 1 North, Ranges 19 and 20 East	
Strip along Hetch Hetchy Road, about 10 sections	3,040.00
	Acres
Township 1 South, Range 19 East	
Section 1	652.00
Section 12	640.00
Section 24	640.00
Section 25	640.00
Section 26	470.00
Section27	20.00
Section 35	887.72
Section 36	901.40
Section 23	220.00
Township 2 South, Range19 East	
Section 3	644.36
Section 10	640.00
Township 1 South, Range 20 East	
Section 5	483.00
Section 6	632.26
Section 7	644.60
Section 8	240.00

Township 1 South, Range 20 East (continued)	Acres
Section 16	160.00
Section 17	640.00
Section 18	646.08
Section 19	648.00
Section 20	640.00
Section 21	360.00
Section 28	300.00
Section 29	640.00
Section 30	642.40
Section 31	916.12
Section 32	926.72
Section 33	938.44
	18,850.09 acres

Treated from the North Crane Creek camp

Township 2 South, Range 19 East	Acres
Section 1	641.08
Section 2	642.68
Section 11	640.00
Section 12	640.00
Section 13	160.00
Township 2 South, Range 20 East	
Section 5	641.64
Section 6	617.43
Section 7	618.96
Section 8	640.00
Section 16	40.00
Section 17	640.00
Section 18	628.28
Total	6,850.07 Acres

Treated from Six Meadows Camp

Township 2 South, Range 20 East	Acres
Section 25	10.00
Section 26	640.00
Section 27	640.00
Section 28	40.00
Section 33	180.00
Section 34	640.00
Section 35	600.00
Township 3 South, Range 20 East	
Section 2	420.00
Section 3	640.00
Total	3,810.00

Treated from Yosemite Valley

Township 3 South, Range 20 East	Acres
Section 16	410.00
Section 17	90.00
Section 21	200.00
Section 22	260.00
Total	960.00 Acres

Portion of Yosemite Grant Total . . . . . 2,700.00 Acres

Treated from Camp A. E. Wood

	Acres
Township 3 South, Ranges 20 and 21 East	
Sections 1, 12, 5, 8, Grouse Creek Sample plot	60.00
Township 3 South, Ranges 20 and 21 East	
Sections 25, 29, Black Rascal sample plot	100.00
Portions along Mawona Road	2,000.00
Township 4 South, Range 20 East	
Section 25	640.00
Section 36	400.00
Township 4 South, Range 21 East	
Section 4	320.00
Section 5	635.01
Section 8	590.00
Section 9	370.00
Section 16	270.00
Section 17	597.64
Section 20	500.00
Section 21	640.00
Section 22	390.00
Section 26	430.00
Section 27	640.00
Section 28	640.00
Section 29	595.60
Section 32	594.00
Section 33	640.00
Section 34	640.00
Section 35	640.00
Section 36	125.00
Township 5 South, Range 21 East	
Section 1	790.69
Section 2	711.62
Section 3	434.32
Section 4	160.00
Section 5	200.00

Township 5 South, Range 22 East	Acres
Section 6, portion of Big Tree Grant	360.00
Total	14,081.78 Acres

Grand total for all areas treated . . . . . 46,951.94 Acres

Values at stake

Because of the nature of National Park administration and policy there are no figures available for the amounts and the values of the timber involved in the areas treated. A comparison, however, can be drawn in the fact that the Federal government and interested private parties paid a sum in excess of $3,000,000 for some 12,000 acres of the lands within the control boundaries. Of course these lands were the cream of the timber lands for the region and can not be held as a true picture of the timber values at stake. Contingent Forest Service and private lands of the same high timber values were involved and the general average for the lands within the control areas will be slightly higher than a year ago.

Before and since the purchase of the Rockefeller Lands the Sugar and Ponderosa Pine stands of the Park have been famous for their extent and the quality of the timber within them. Sugar Pine trees 80 or more inches in diameter and over 200 feet in height are not at all uncommon sights on cruise strips. These forests are the climax forest types for the region and are also some of the finest examples of their type. Accepted cruises of some of the Rockefeller Purchase lands now within the Park show sixteenth sections often having over 2 million board feet of timber, most of which was Sugar Pine and a few such 40-acre areas had as much as 4 million feet of timber. The lands in the Ackerson Meadows and the Crane Flat regions are good examples of the heavy stands of timber protected by insect control operations. It is estimated for the entire area treated that there was an average of 1,500,000 board feet per 40 acres and that at least 2 billion feet of some of the finest timber of the world were given protection.

Insects responsible

Again the insect control campaign was directed mainly against the Western Pine Beetle (Dendroctonus brevicomis Lec) and the Mountain Pine Beetle (D.monticolae Hopk.) population in the Ponderosa and Sugar Pine. A fair amount of control work was against the Jeffrey Pine Beetle particularly in the Bald Mountain region. A new feature of control work in Yosemite National Park was the control project in the Douglas Fir on the talus slopes surrounding Happy Isles and Mirror Lake. The Hemlock Bark Borer (Melanophila drummondi) has been tentatively identified as the insect responsible for the heavy losses in the Douglas Fir. The character of

Insects responsible (continued)

the infestation present in the Pine stands of the Park has evidently undergone quite a change. Volume losses from the Western Pine and the Mountain Pine Beetles are considerably less than last year for practically the same areas. However, there has been a noticeable increase in Flatheaded Borer attacks in the Ponderosa Pine on the poorer sites being particularly true in the Hetch Hetchy Road strip from Mather toward the Dam. Losses in the Jeffrey Pine from the Jeffrey Pine Beetle have increased considerably as observations in the Bald Mountain, Cottonwood Creek and one trip in the Illilouette Canyon show. The insects of a primary nature destroyed in this campaign include the following:

Host	Insect responsible for Damage
Ponderosa Pine	1. Western Pine Bark Beetle (Dendroctonus brevicomis Lec.)
	2. Mountain Pine Bark Beetle (Dendroctonus monticolae Hopk.)
	3. Engraver Beetles (Ips spp.)
	4. Flatheaded borers (Melanophila gentilis, etc.)
	5. Red Turpentine Beetle (Dendroctonus valens)
Sugar Pine	1. Mountain Pine Beetle (Dendroctonus monticolae Hopk.)
	2. Engraver Beetles (Ips spp.)
	3. Flatheaded borers
	4. Red Turpentine Beetle (Dendroctonus valens)
Jeffrey Pine	1. Jeffrey Pine Beetle (Dendroctonus jeffreyi)
	2. Engraver beetles (Ips spp.)
	3. Flatheaded Borers
Douglas Fir	1. Hemlock Bark Borer (Melanophila drummondi)
	2. Golden Buprestid (Buprestis aurolenta)
	3. Rustic Buprestid (Buprestis rusticorum)
	4. Twig beetles (Pithyopthorus sp.)
	5. Scolytus (Scolytus sp.)
	6. Cerambycid (Semanotus ligneus)

No Lodgepole Pine were treated at all in this campaign as the altitude/range of this tree was above the areas in which control work was carried out and also at the time of the campaign the Lodgepole Pine country was under deep snow.

The losses in the White Fir from a species of Scolytus are continuing at approximately the same rate as a year ago. The losses in the Incense Cedar are not as noticeable as they were last year but the losses are about the same. It is merely a case of getting used to seeing dead and dying Cedar.

Propagation of Predators.

The care with which the predators such as the Clerids and the Trogositids were favored a year ago and again this season has evidently borne some fruit. Predators of all types were fairly common and large numbers were found to be overwintering in the crevasses of the Sugar and Ponderosa Pine bark. The increase in the number of predators may have had a considerable influence on the reduction in the volume of losses for the comparable overwintering generation. Again instructions to the treaters were to leave all abandoned bark on the logs and to leave a 6 - 10 inch strip of bark remaining on the stump above the root collar for the propagation of the predators. This has become second nature in insect control procedure for Yosemite National Park. The Tiger Clerid (Enoclerus lecontei), the Red-Bellied Clerid (Enoclerus sphegeus) and the Blue-Green Trogositid (Temnochila virescens) were the Predators most commonly observed. Rarely a Red Flat Beetle (Cucujus clavipes) was to be seen.

Character and Intensity of the Infestation

The evident decrease in the amount of infestation present in the Ponderosa Pine as reported a year ago seems to be well founded as the volume of losses from the Western Pine Beetle has been greatly reduced. Losses from the Mountain Pine Beetle in the Sugar Pine have taken a tremendous drop as evidenced from the loss last year,, of 7,986,820 board feet against 2,127,040 for the comparable generation this past season. The reduction of losses in the Sugar Pine has been very gratifying and indicates the possibility of the downward trend of losses from the Mountain Pine Beetle continuing from its high peak of 1932.

A decided increase in losses from the Western Pine Beetle has occurred and is now occurring in the Miguel Meadows region where control work has never yet been attempted. Losses have jumped from practically nothing in two years to an incipient epidemic stage and it will be necessary to carry out control operations here in the near future.

The attacks of the Flatheaded Borer are more noticeable this year than last. The poorer sites such as those along the Hetch Hetchy Road and along the Big Oak Flat Road have been very heavily

hit. In fact the losses were becoming so pronounced along the Hetch Hetchy Road that 86 trees were treated for these beetles. At least one of these trees was found to be infested with Jeffrey Pine Beetles at an elevation of 4,500 feet. Flatheaded borers were quite common in mixed brood trees in the other treated areas.

The outbreak of top-killed young trees in Yosemite Valley has evidently subsided as no new striking developments have occurred in this respect. The Engraver Beetles have not been as common as they were a year ago as their place seems to have been taken by the Flatheaded borers. The Engraver Beetles were not as common this year in the treated trees as they were a year ago.

Investigations in the Douglas Fir indicate the presence of at least 3 Flatheaded Borers and several secondary beetles. The Flatheaded borer believed to be responsible for the losses in the Douglas Fir is the Hemlock Bark Borer (Melanophila drummondi). The other two Flatheads so far reported from the Douglas Fir are the Golden Buprestid (Buprestis aurolenta) and the Rustic Buprestid (Buprestis rusticorum). A very few Douglas Fir Beetles (Dendroctonus pseudotsugae) were obtained but they were strays and had no influence whatever on the large number of losses in the Douglas Fir. A decidedly noticeable feature of the infestation in the Douglas Fir was the large number of pupal cells belonging to the Braconidae group of parasites. Adults of these parasites have been observed in much larger numbers than the adults of the insects believed to be killing the Douglas Fir. A few Scolytus and Pithyopthorus beetles have been observed in the branches of the Douglas Fir killed. Trap cage experiments are now being carried out on selected infested Douglas Fir in the Mirror Lake region and the exact character of the infestation should be determined by the next treating season.

Recent observations in the Illilouette Valley indicate the presence of the considerable amount of losses from the Jeffrey Pine Beetle, the increase evidently being coincident with the rise of activities of this beetle in the Little Yosemite Valley where control operations were carried out last summer by an E.C.W. stub camp. It may be necessary to request the placing of a stub camp in this area this coming summer.

History of the Present Control Program

In the main the present control campaign is a continuation of the very active campaign against destructive forest insects inaugurated by the Superintendent in 1932 with a comprehensive survey of the insect infestation conditions present in the Park.

With the shutdown of insect control operations by the regular control organization in the Spring of 1933 a summer insect control maintenance campaign was started using enrolled labor from the C.C.C. camps allotted to Yosemite National Park. With the exception of the treating in the Jeffrey and Lodgepole Pine in Little Yosemite Valley this treating was by the Solar Heat Method. The use of this method following a well organized and efficient spring control has helped enormously in reducing the amount of losses from the destructive forest insects as is evidenced in the considerably reduced statement of losses for the over-wintering generation of 1933-34. The Solar Heat Method was used, until the last week of August when cooling weather conditions reduced the effectiveness of the method. All summer insect control activities were with the exception of the work in the Little Yosemite suspended for the season, late in August.

Cooperative surveys along the west boundary of the Park late in August and early in September led to the calling of a conference in the office of the Superintendent on the 7th of September. Representatives of the Bureau of Entomology, the Stanislaus National Forest and Yosemite National Park were present. Recommendations for control appropriations of $25,000 for both the Sierra National Forest and the Yosemite National Park were made and later obtained from the National Industrial Relief Administration. A cooperative agreement regarding the adjoining National Forest and private lands were entered into whereby the Park would undertake treating operations on 10,500 acres outside of the Park. Later developments showed that the Park Service could not lawfully treat lands outside of the National Park. The Stanislaus National Forest, to take advantage of the organization developed in the Park, agreed to finance the Park's operations on lands outside of the Park. Eventually a total of $6,000 of NRA funds was allotted to the Park for this purpose of which approximately $800 was returned. The most perplexing problem of the whole insect infestation situation was thus taken care of in a very satisfactory manner. The re-infestation from private lands adjoining control areas has always been and always will be a factor to be given the greatest consideration in the planning of insect control campaigns. Re-infestation from the private lands on the west boundary helped to nullify considerably the control work of the Spring of 1933 which was carried on in the Ackerson Meadows and Crane Flat regions.

The work along the Wawona Road and in the Wawona Basin was primarily a maintenance control to carry on the work so auspiciously begun a year ago. All of the territory from the West Portal of the Tunnel to the West Boundary of the Mariposa Big Trees Grove was treated along with adjoining Forest Service cooperative territory at Bishop Creek and Rush Creek. Losses along this territory were considerably less than a year ago due to a great deal of the summer maintenance control of the E. C. W.

The small amount of work done in Yosemite Valley was a continuation of the permanent campaign in the Valley started in 1931.

The control work in the Douglas Fir is a new development in activities not only in Yosemite National Park but throughout California as a whole. The present infestation in the Douglas Fir has been developing for the last two years, notably 1932 and 1933, on the talus slopes of Yosemite Valley and also at Hetch Hetchy. Provisions were made to treat this infestation last year but due to the lateness of the season and the pressure of the campaign in the Pines it was passed by for the time. This could be done for a limited time, as all indications point to a life cycle for the Hemlock Bark Borer (Melanophila drummondi), which is believed to be the insect responsible, of more than one year and possibly as much as three years. Cage trap experiments now being conducted will give the information before the beginning of the next control project against this beetle. Because of the poor trenching conditions on the talus slopes and the possibility of slow but surely spreading fires it is necessary that this control work take place in the winter months. January and February were used this winter and it was possible through this control work to keep the overhead for the regular control work employed on a meritorious project over the winter months.

Cooperative Activities

As in the past the general insect control program came under the supervision of Mr. John M. Miller, Senior Entomologist of the Bureau of Entomology through Mr. John V. Patterson who was in charge of the control work on the Stanislaus National Forest. The advice and the assistance obtained from the Bureau of Entomology was of great material benefit to the Park's insect control organization and at all times cooperative activities between the two organizations was of the best character for efficient work. This year again the Bureau was notified in time of the treating of the trees to be found on Plot #14 of the Regional Survey located near Aspen Valley Ranger Station. Mr. Kenneth Salman, Associate Entomologist, came up from Berkeley to obtain the necessary data and he was given all the assistance necessary by the treating crews at Ackerson Meadows.

Mr. Donald De Leon was detailed from Ansel Hall's office in Berkeley to the Bureau of Entomology for entomological work and in this capacity spent some time in Yosemite Valley studying the infestation in the Douglas Fir. He set up two tree cages on infested Douglas Fir for the purpose of determining the insects responsible for the deaths of the Douglas Fir.

The same cooperative conditions existed on the Wawona Road with the Sierra National Forest as last year, except that not as large an appropriation was necessary and also an additional area was treated. The additional area was located at El Portal far from any Sierra National Forest work camp. The Park insect control

organization did the treating on the Forest Service lands in the Bishop and Rush Creek Basins and at El Portal for slightly less than the appropriated $1,800. As the areas treated under the agreements are naturally a part of the Park's control activities along the Wawona Road and it would cost the Forest Service considerable establishing a camp, it best serves the Federal Government from an efficiency and cost standpoint to keep on with the present arrangement. A total of 3,609.17 acres were treated for the Sierra National Forest on which 157 trees with a volume of 360,960 board feet were felled at a cost of $1,442.99. A summary of the treating by sections follows:

Forest Service Cooperative Areas Along Wawona Road

Bishop Creek areas:

Township 4 South, Range 21 East			
Section 6	139.83 acres	15 trees	35,090 feet
Section 8	278.00 "	22 trees	33,120 "
Section 17	277.64 "	11 "	23,360 "
1 1/4	695.17 acres	48 trees	91,570 feet

Rush Creek areas:

Township 4 South, Range 20 East			
Section 25	640.00 acres	17 trees	48,930 feet
Section 36	400.00 "	8 "	16,830 "
1 2/3	1040.00 acres	25 trees	65,760 feet
Township 4 South, Range 21 East			
Section 32	554.00 acres	27 trees	120,810 feet
Township 5 South, Range 21 East			
Section 4	160.00 acres	2 trees	9,780 feet
Section 5	200.00 "	5 "	15,270 "
1/2	360.00 acres	7 trees	25,050 feet

Summary of Forest Service Cooperative areas:
Approximately 4 1/4 sections, 2,649.17 acres, 107 trees, 303,190 feet.

El Portal pocket - U.S.F.S. financed, Sierra National Forest

50 Ponderosa Pine, 57,760 feet, 1330 total diameter, 1163 average volume, 26.6 average diameter.

Township 3 South, Range 20 East			
Section 16	410 acres	18 trees	24,510 feet
Section 17	90 acres	12 "	10,030 "
Section 21	200 "	10 "	10,120 "
Section 22	260 "	10 "	13,100 "
	960 acres	50 trees	57,760 feet

The cooperative control carried out with the Stanislaus National Forest on the west side of the Park was on a large scale. A year ago no cooperation activities were in force, the Park being the only organization doing control work along that side of the Park. Because of last minute complications regarding the use of Park Service funds for insect control outside of the Park it was necessary that the Forest Service finance the treating on the intervening private lands and interspersed Forest Service Lands. The Stanislaus National Forest made available for the Park organization a total of $6,000 of which $800 was returned at the expiration of the control season. Only actual treating costs were assessed against this cooperative fund. The costs of camp construction were absorbed by the Park Service. Two camps were constructed for winter occupancy one at North Crane Creek on private land and the other at Ackerson Meadows on Forest Service land. A total of approximately 10,500 acres of private and Forest Service lands were assigned to the Park as its share of the cooperative control along the west side of the Park. All of the assigned territory was treated and in doing so it was necessary to employ for a short time a stub C.C.C. camp from the camp headquarters at Cascades. A total of 430 trees and logs with a volume of 1,469,460 board feet were treated on this cooperative area. A considerable portion of these lands were patented lands mostly in the hands of the Yosemite Lumber Company and the White and Friant Lumber Company from whom permission was obtained to treat the infested trees found. All of the timber marked for treating on the cooperative lands were treated. The cost of this cooperative control to the Stanislaus National Forest was $5,187.89. A summary of the cooperative treating by sections follows:

Forest Service Lands Worked From the North Crane Creek Camp

Township 2 South, Range 20 East			
Section 6 (west half)	296.63 acres	21 trees	71,160 feet
Township 2 South, Range 19 East			
Section 1	641.08 acres	64 trees	235,570 feet
Section 2	642.68 acres	31 trees	115,990 "
Section 11	640.00 "	12 "	45,110 "
Section 12	640.00 "	7 "	24,270 "
4	2563.76 acres	114 trees	420,940 feet

Summary of above North Crane Creek territory:

4 1/2 sections, 2860.39 acres, 21 trees, 492,100 feet.

Forest Service lands worked from Ackerson Meadows

Township 1 South, Range 19 East			
Section 1	662.00 acres	33 trees	29,050 feet
Section 12	640.00 "	47 "	74,420 "
Section 23	220.00 "	10 "	36,350 "
Section 24	640.00 "	25 "	62,150 "
Section 25	640.00 "	44 "	133,810 "
Section 26	470.00 "	37 "	124,680 "
Section 27	20.00 "	10 "	14,750 "
Section 35	887.72 "	42 "	134,800 "
Section 36	901.40 "	82 "	118,690 "
8	5071.12 acres	330 trees	728,700 feet
Township 2 South, Range 19 East			
Section 3	644.36 acres	16 trees	81,400 feet
Section 10	640.00 "	9 "	27,870 "
2	1284,36 acres	25 trees	109,270 feet
Township 1 South, Range 20 East			
Section 30	402.40 acres	12 trees	49,500 feet
Section 31	916.12 acres	52 "	171,400 "
1 1/2	1318.52 acres	64 trees	210,900 feet

Summary of above Ackerson Meadows territory:

11 1/2 sections, 7464.00 acres, 409 trees, 1,012,520 feet.

Grand Summary of North Crane Creek and Ackerson Meadows territories:

16 sections,	10,314.39 acres.	430 trees,	1,433,460 feet
1/3 "	220.00 "	10 "	36,350 "
16 1/3 sections	10,534.39 acres	440 trees	1,469,810 feet.

Organization of Control Work - Mess

The setup peculiar to Yosemite National Park of absolute separation of the mess operations from the control organization was adhered to again in this control program. The operation of the mess is in the hands of a specialized corps and members of the work organizations are relieved of the anxiety incidental to all mess operations. The divorcement of the mess from the cares of the labor foremen is a feature of insect control work in Yosemite Park that can not be too highly commended and it is extremely desirable to the insect control organization that this system continue as it is for all control operations.

At the beginning of control operations last November meals were at the rate of $1.05 per day or 35 cents per meal. Later, the meal rate was changed to 90 cents per day or 30 cents per meal. In April a charge of 10 cents was made per day for lodging equipment. As is always the case meals were ample and well prepared. Any profit or any loss on mess operations under this system is kept in their funds and is never plowed back into control operations as is the usual practice on insect control operations by other government organizations.

Operations

A slightly different setup existed this year in the overhead personnel whereby Assistant Chief Ranger John H. Wegner was placed in charge of all of the Forest Protection activities which included Insect Control. Ranger Forester Emil F. Ernst was left in charge of the technical side of the work. Foreman William Mayhall was again in charge of the treating. Practically the same setup of last year existed in which the spotting and the treating organizations were separate units although working side by side for the common goal. Contributed time practically doubled this year because of the addition of Assistant Chief Ranger Wegner to the overhead. Outside of the Assistant Chief Ranger and the Ranger-Forester there was no other contributed time to the operations.

Attempts were made to build up the control camps to the same size as last year in which 32 men were the standard camp but because of the scattered infestation necessitating longer walks between trees the standard was lowered to 25 men per control camp. The spotting organization remained at 4 while two sets of treaters of 3 men and a truck driver each were dropped from the care of the foremen. Although Yosemite National Park has insect control foremen of the highest type and ambition the more scattered infestation this year compelled the reduction in size of the treating crew to a controllable size. The camp organization this year was therefore composed as follows:

Treating		Spotting	
Foreman	1	Head spotter	1
Treaters	18	Compassman	1
Truckdriver	1	Spotters	2
Fireguard	1		
	21		4

A sawfiler was employed at the North Crane Creek and Ackerson Meadows camps in turn and he was able to adequately take care of the sawfiling needs of both of these camps. The sawfiling needs of the camp in the Valley and the camp at Wawona was taken care of by the E.C.W. sawfiler located at Cascades. In each camp there was employed a bull cook to take care of the needs of the camp and to supply the kitchen with the necessary firewood.

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The spotting crew of 4 men was separate from and still a part of the camp organization. They worked independently of the treating crews, marking the infested trees, keeping the records, the costs, and checking over the work of the treaters. The spotting crew saw that the treating progressed in an orderly manner so that no trees would be missed that were spotted for treating. The standard tree tags and the master map were the means by which the treating was kept going in an orderly manner. Because of the trained men and the opportunity to start spotting several days in advance of the treating crews the confusion and rush incidental to the beginning of control operations of a year ago was entirely eliminated and the spotting organization functioned as wellas it possibly could function.

The position of the treating foremen was precisely the same as last year in which being relieved of the work in the operation of the mess he was free to carry on the most important reason for his employment which is to see that treating is done in the most effective way. Camp sanitation and the keeping of the time are the only distracting features of his work in the insect control organization of the Park and it is this method of doing things that has made insect control operations in Yosemite National Park a model of efficiency In the woods it was the duty of the foreman to move the men from spotted tree to spotted tree according to the maps which are turned over to him at the required time. By coming back for the men as they finished a tree it was possible for him to check up on the work and to correct any apparent mistakes in the treating.

The treating crews in the Yosemite insect control organization are composed of 3 men, all loggers, drawing equal pay and doing equal work. One of the three is usually accepted as head faller but he does not receive any additional pay as all his instructions come from the foreman. All of the loggers help in falling, limbing, bucking if any, preparation of the fire trenches and in the burning of the infested bark. It was the custom that when the tree was almost ready to burn that two of the men would proceed to the next tree leaving the third to complete the burning.

After the fire was considered reasonably safe the third man moved up to help the other two loggers. Thus it was possible to give fire protection without loss of valuable time. It is believedthat this system insures a smooth method of operation and also guarantees the proper treating of the infested bark.

A maximum of 79 men were employed at one time, during April, on insect control work. Because of the spell of dry, hot weather, it was necessary early in the month to raise the crews from 64 men to 79 men so as to get the treating completed before it would be impossible to burn without damage to the surrounding forests.

Practically no rain fell during the months of March and April and temperatures were unseasonably high. All the mountain roads were open long before the normal time which indicates in itself that the snow pack for the season did not stay on the ground the normal length of time. During this period of extremely dry and hazardous weather 3 experienced men were detailed as fire guards.

Insect control operations change with the weather, transportation, accessibility of the infested trees, the intensity of the infestation and a host of other factors. Because of the intensity of the infestation 25 man camps were the rule for the treating carried out under this program while a year ago it was 32 men camps. The Park has had enough experience now in control operations to place the number of men on normal insect control camps at between 25 and 32 depending mostly on the intensity of the infestation. With comparatively light infestations the camps should approximate 25 men and in heavy infestations the camps should not have more than 32 men.

The Camps

The bulk of insect control pperations centered around the camps at North Crane Creek and Ackerson Meadows. Both of these camps are outside of the Park, one being on private land at North Crane Creek, and the other on Forest Service land at Ackerson Meadows. Construction of these two camps was started in November with NRA carpenters at $1.10 per hour. These camps were constructed for winter occupancy and everything possible to make comfortable and healthy camps was done with this object in view. These camps are models of tent camp construction being tight against the elements and roomy. Because of transportation difficulties these two camps were shut down during the months of January and February. Ackerson Meadows camp was reopened on the 12th of February and occupied until the 30th of April.

The camp at North Crane Creek was reopened on March 12th by an E.C.W. stub camp organization from their headquarters at Cascades. They occupied this camp until the 16th of April when they were returned to their main camp upon the completion of their assignment.

The main labor camp in Yosemite Valley was headquarters for the treating of the Douglas Fir and the few Ponderosa Pine in the Valley. It was also headquarters for the treating at El Portal for the Forest Service.

A camp was reinstalled at Big Meadows on March 21st for the treaters of the Big Meadows unit. This camp was shut down on the 25th of April because of the shortage of funds necessitating the leaving of 25 spotted trees standing in the woods.

Camp A. E. Wood was again the headquarters for the treating crews on the Wawona Basin and Wawona Road strip. Treating started at this camp on the 22nd of January and continued through until the 30th of April when this camp moved to the Valley so as to treat the El Portal pocket for the Forest Service.

Dates of Opening and Closing Work

Treating was started in the Fall of 1933 from the camp at North Crane Creek on the 28th of November. The operations started at the higher elevations around Gin Flat so that as the snow got deeper the crews could drop down to lower elevations where the snow would not be so deep. Treating from the North Crane Creek and Ackerson Meadows camps was suspended on the 21st of December due to the roads becoming snow-blocked which made the servicing of the camps very difficult. The spotting organization was in a better position to handle their work than last year as they had at least a full week spotting ahead before the beginning of treating operations. Although the infestation was more scattered than a year ago, it was not difficult to keep ahead of the treaters because of the more open ground conditions. Because of the central location of the camps and the relative ease of transportation after the camps were reopened in the Spring it was not necessary to do any considerable amount of camp transfer as was the case a year ago when a great deal of ingenuity was used so as to lose as little time as possible. The Big Oak Flat Road was closed for short periods but this did not seriously hamper any of the control work.

Treating came to an end in this control campaign in the El Portal pocket of the Forest Service on the 4th day of May.

Tabulated list of Opening and Closing Dates in Each Unit

Camp	Unit	Opening Date	Closing Date
North Crane Creek	Crane Flat	Nov. 23, 1933	Dec. 21, 1933
North Crane Creek	Crane Flat	Mar. 12, 1934	April 16, 1934
Ackerson Meadows	Ackerson Meadows	Dec. 1, 1933	Dec. 21, 1933
Ackerson Meadows	" " " "	Feb. 12, 1934	April 30, 1934
Yosemite Valley	Yosemite Valley (Douglas Fir)	Dec. 27, 1933	Mar. 2, 1934
Camp A. E. Wood	Wawona Road Wawona Basin	Jan. 22, 1934	April 30, 1934
Big Meadows	Big Meadows	Mar. 12, 1934	April 26, 1934
Yosemite Valley	Yosemite Valley	April 3, 1934	April 7, 1934
Yosemite Valley	El Portal	April 27, 1934	May 4, 1934

Climatic Conditions

Until the 1st of March weather conditions were ideal for insect control work throughout all of the units. From the 1st of December to the 1st of March, 16.29 inches of precipitation fell which is more than ample to keep down any spreading fires; while from the 1st of March to the end of the control operations on the 7th of May, only 1.29 inches of precipitation fell. Temperatures were as high as 85 degrees Fahrenheit and for a period of 16 days with one exception the maximum temperatures were 75 or above. In this time there was not even a trace of precipitation. In this period of exceptionally dry weather there were four fires needing control, none of which were over 2 acres in extent. All except 1 were on Forest Service lands; one of the remaining three fires was fought on the areas treated by the Forest Service control organization and was less than an acre in size. Prompt action by the E.C.W. stub camp at NorthCrane Creek prevented what may have been a very bad fire. In the 173 days of the control program 17.64 inches of precipitation fell which was more than sufficient to keep down any dangerous fire hazard were it spread evenly over the treating period.

Weather Data during control operations

	Date	Maximum	Minimum	Precipitation	Character of Day
November	16	60	30	0	Clear
	17	62	27	0	"
	18	62	26	0	"
	19	61	26	0	"
	20	59	28	0	"
	21	65	28	0	"
	22	64	29	0	"
	23	65	31	0	"
	24	66	32	0	"
	25	64	31	0	"
	26	63	30	0	"
	27	62	35	0	Cloudy
	28	55	30	.06	"
	29	60	30	0	Clear
	30	66	23	0	"
December	1	50	21	0	Clear
	2	53	24	0	"
	3	50	29	.69	Cloudy
	4	50	25	.05	Clear
	5	48	26	0	P. Cldy.
	6	49	27	0	"
	7	54	27	0	Clear
	8	54	32	0	"
	9	60	31	0	"
	10	63	35	0	"
	11	57	35	0	P. Cldy
	12	55	40	2.80	Cloudy
	13	54	32-	2.20	Cloudy

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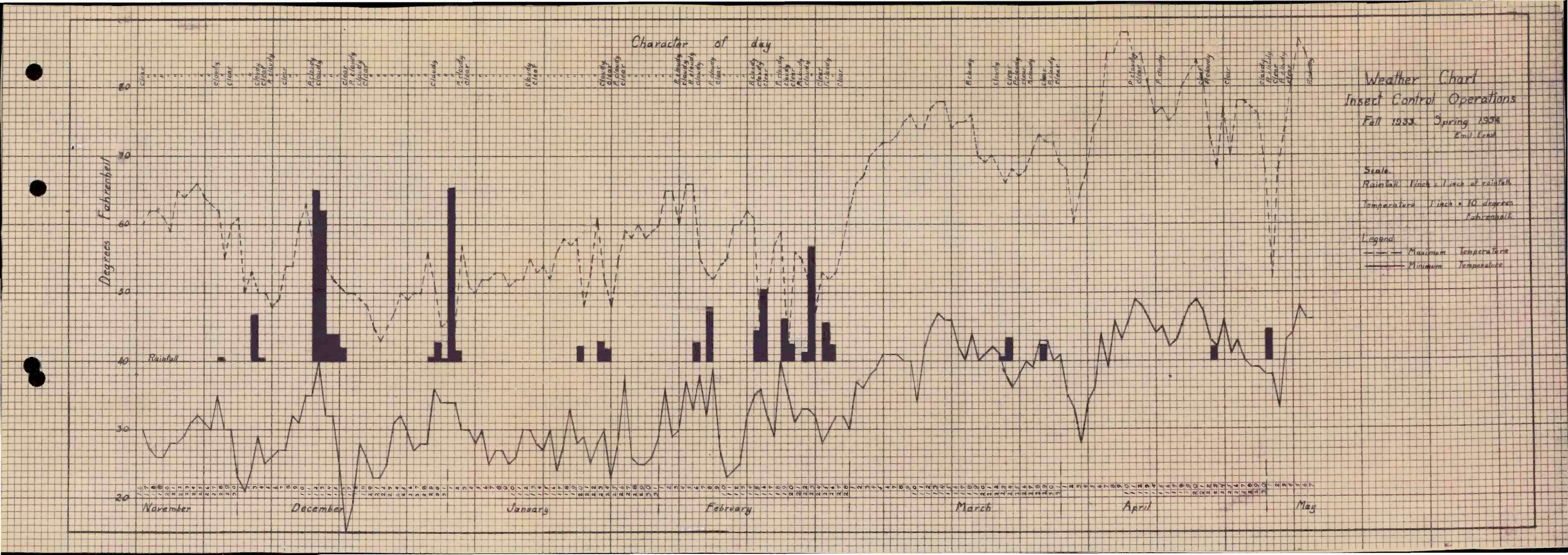
Date		Maximum	Minimum	Precipitation	Character of Day
December	14	52	32	.40	Cloudy
	15	51	25	.40	"
	16	50	15	.20	Clear
	17	60	19	0	P. Cldy
	18	49	28	0	Cloudy
	19	48	26	0	Clear
	20	45	23	0	"
	21	43	23	0	"
	22	45	25	0	"
	23	47	31	0	"
	24	50	32	0	"
	25	49	30	0	"
	26	50	27	0	"
	27	50	28	0	"
	28	56	28	0	"
	29	51	36	.07	Cloudy
	30	45	34	.28	"
	31	46	34	.04	"
January	1	45	34	2.54	Cloudy
	2	57	30	.16	P. Cldy
	3	51	30	0	Clear
	4	50	28	0	"
	5	52	30	0	"
	6	52	28	0	"
	7	53	27	0	"
	8	53	27	0	"
	9	51	25	0	"
	10	52	26	0	"
	11	52	30	0	"
	12	55	30	0	Cloudy
	13	53	28	0	Clear
	14	54	27	0	"
	15	52	30	0	"
	16	56	24	0	"
	17	58	28	0	"
	18	57	33	0	"
	19	58	28	0	"
	20	48	29	.22	Clear
	21	53	26	0	"
	22	61	28	0	"
	23	62	30	.30	Cloudy
	24	48	23	.18	Clear
	25	58	28	0	P. Cldy
	26	59	38	0	Clear
	27	58	26	0	"
	28	60	28	0	"
	29	58	25	0	"
	30	59	26	0	"
	31	60	29	0	"

	Date	Maximum	Minimum	Precipitation	Character of Day
February	1	65	36	0	Clear
	2	65	29	0	"
	3	60	30	0	P. Cldy
	4	66	37	Tr.	Cloudy
	5	66	33	0	P. Cldy
	6	55	33	.29	Cloudy
	7	53	32	0	"
	8	52	39	.80	P. Cldy
	9	54	27	0	Clear
	10	55	23	0	"
	11	60	24	0	"
	12	60	25	0	"
	13	62	32	0	"
	14	61	35	0	Pl Cldy
	15	42	36	.45	Cloudy
	16	50	32	1.05	Clear
	17	57	29	0	"
	18	59	40	0	P. Cldy
	19	42	35	.61	Cloudy
	20	56	31	.25	Clear
	21	55	33	0	P. Cldy
	22	52	33	.13	Cloudy
	23	47	32	1.69	Cloudy
	24	53	28	0	Clear
	25	52	30	.56	P. Cldy
	26	53	32	.23	"
	27	57	32	0	Clear
	28	62	30	0	"
March	1	66	37	0	Clear
	2	67	36	0	"
	3	70	38	0	"
	4	71	39	0	"
	5	72	41	0	"
	6	72	41	0	"
	7	73	41	0	"
	8	76	40	0	"
	9	76	40	0	"
	10	74	34	0	"
	11	74	42	0	"
	12	77	45	0	"
	13	78	47	0	"
	14	78	46	0	"
	15	74	46	0	"
	16	75	42	0	"
	17	75	40	0	P. Cldy
	18	76	44	0	"
	19	70	40	0	"
	20	69	41	tr.	"
	21	70	42	0	Cloudy
	22	68	41	.07	"
	23	66	38		

	Date	Maximum	Minimum	Precipitation	Character of Day
March	24	68	36	.33	Clear
	25	67	38	0	P. Cldy
	26	68	40	0	Clear
	27	71	39	0	P. Cldy
	28	73	43	0	"
	29	72	43	.23	Clear
	30	72	40	0	P. Cldy
	31	69	41	0	Clear
April	1	68	35	0	Clear
	2	60	33	0	"
	3	65	28	0	"
	4	68-	34	0	"
	5	74	36	0	"
	6	76	44	0	"
	7	85	39	0	"
	8	85	46	0	"
	9	88	43	0	"
	10	88	46	0	"
	11	64	49	tr.	P. Cldy
	12	85	48	0	Clear
	13	80	46	0	"
	14	76	44	0	"
	15	77	45	0	P. Cldy
	16	75	42	0	"
	17	76	43	0	"
	18	80	46	0	"
	19	82	48	0	"
	20	84	49	0	"
	21	81	47	0	Clear
	22	73	43	0	P. Cldy
	23	68	42	.20	"
	24	77	46	0	"
	25	70	41	0	Clear
	26	78	43	0	"
	27	78	40	0	"
	28	77	39	0	"
	29	76	39	0	"
	30	68	38	0	Cloudy
May	1	52	38	.46	P. Cldy
	2	68	33	0	Clear
	3	74	43	0	P. Cldy
	4	81	44	0	Clear
	5	87	48	0	"
	6	85	46	0	"
	7	81	46	0	P.Cldy


Character of day
Degrees Fahrenheit
Rainfall
80
70
60
50
40
30
20
November
December
January
February
March
April
May
Weather Chart
Insect Control Operations
Fall 1933 Spring 1934
Emil Ernst
Scale
Rainfall 1 inch = 1 inch of rainfall
Temperature 1 inch = 10 degrees Fahrenheit
Legend
Maximum Temperature
Minimum Temperature

Wages Paid

The funds provided for the control program of the Fall of 1933 and the Spring of 1934, were obtained from NIRA appropriations. The high wages paid are reflected very strongly in the costs of treating and more so particularly in the case of camp construction where the law compelled the employment of skilled carpenters at a very good wage. Previously all camp construction had been done by woodsman who were later used as treaters. Treaters were paid $4.50 per 8 hour day last year and they worked 6 days per week; treaters this year were paid $6.30 per 8 hour day and worked 5 days per week. In some instances, notably in the Valley, and Camp A. E. Wood the 6 hour day was the rule. In all of the outlying camps the 40 hour week was the rule.

General Foreman	$200.00 per month
Camp Foreman	175.00 " "
Head spotter	1.10 per hour
Spotter	.85 " "
Truck Driver	.85 " "
Logger (treaters)	.85 " "
Laborer	.60 " "
Bull Cook	.60 " "
Saw Filer	1.10 " "
Plumber	1.10 " "
Plumber Helper	.85 " "
Carpenter	1.10 " "
Carpenter Helper	.85 " "
Line Man	1.10 " "
Line Man	175.00 per month

The services of permanent Civil Service appointees such as the blacksmith, the harness maker, etc., were enlisted for small jobs. Due to the great variation in their salaries because of length of service and the nature of the appointments the schedules are not recorded.

The class of labor obtained was not as satisfactory as that obtained a year ago for the same type of work. Considerable difficulty was encountered in taking men from established labor lists in the adjoining counties particularly in Tuolumne County where anybody who claimed to be a woodsman was sent up to treat insect infested timber. The labor turn-over for this reason was much higher than last year and it took a long process of elimination to finally obtain a reasonably efficient treating organization. All the difficulties encountered are excusable whenconsidering that the prime object of the NIRA was to put men to work but when the rate of efficiency is to be considered it is another story.

Methods of Spotting

Two methods of spotting were used: the first, the strip cruising method; and the second the contour cruising method. Because of the character of the infestation on the Wawona Road Strip and the Wawona Basin, the contour cruising method was used in those areas almost exclusively. Strip cruising was the rule along the west boundary of the Park and in the Big Meadows unit. Two man parties were used in the contour cruising method and four men parties on the strip cruising method.

Instructions were again given to use reasonable judgement in the selection of the brood trees to be treated and not to pass anything by that had a paying brood. The theory of percentage treating is the guiding star of insect control work in Yosemite National Park. The basis of the theory is that the unit cost of killing insects is less in trees of large size having fair sized broods than in small trees with the same kind of a brood. Because of the small amount of infestation present in the small sized trees, such as poles, and the cost of treating one large heavily infested tree, would be as much as a small group of small trees being treated. The small trees were not picked up in every case unless they were close to other trees being treated. Color is often the deciding factor in spotting in Yosemite National Park and this is particularly true in the case of the Sugar Pines. Some stage of fading is more often the only indication of a brood in both Sugar and Ponderosa Pine and it is upon the detection of the tell-tale fade that the training of the spotters centers. The presence of pitch tubes is not common enough to form the basis of the spotting procedure, although this season there was a higher percentage of green trees spotted than last year. The number of green trees picked up approximated between 5 and 10 percent which is considerably higher than a year ago.

The spotting records and the maps were kept by the compassman who assigned tree numbers to the spotters in consecutive order as each tree was marked for treating. The spotters tagged the tree with the standard tree tags of the Bureau of Entomology, filling out the necessary data and inserting the tags, folded up in quarters, in slits hacked in the bark. Care was taken in making these slits so that the flowing pitch would not get on the tags. The tree was blazed on two sides so that the treating foreman would have no difficulty in locating the infested tree. Each tree was marked with its assigned number so that in case the tag was lost or destroyed a record remained that could be checked against the spotting records. Fewer tags were chewed up by squirrels than was the case a year ago.

No spotting costs were assessed against the work in the Douglas Fir in Yosemite Valley because trees were marked and recorded as they were treated. Complicated data was taken on 204

of the Douglas Fir. No systematic method of spotting was employed in this case on account of the small area involved and the ease of finding the trees to be treated. Spotting in the Douglas Fir is the easiest kind of spotting yet met with in insect control work anywhere in the Park.

Spotting costs and Man-Hours Spotting

Number of Man-Hours spotting, including compassman	3,768 hours
Number of Man-Hours head spotting	1,182 hours
Total number of Man-Hours spotting	4,950 hours
Volume of trees spotted - excluding Douglas Fir	4,081,720 feet
Number of trees spotted - excluding Douglas Fir	1,694 trees
Acres spotted	46,951.94 acres
Number of trees spotted per Man-Hour	.34 tree
Volume of trees spotted per Man-Hour	824.60 feet
Acres spotted per Man-Hour	9.48 acre
Cost per tree spotted	$2.06
Cost per thousand board feet spotted	$0.858

Methods of Treating

Treating was carried on in all sorts of weather with both very favorable and very unfavorable burning conditions. Control work started with the Fall rains and was carried on along the west boundary of the Park until mounting snows blocked the necessary service roads to the camps. The treating in the Douglas Fir was auspicious to begin with but soon became dangerous on account of the lack of snow on the talus slopes at Happy Ilses and Mirror Lake. Only in the real high elevations was any treating in the snow done as the snow left the lower elevations very early. Part of the high costs reflected in the treating costs were due to the necessity of con structing good fire trails around the treated logs and the extreme care taken in burning.

Only the bark containing an infestation was burned; the abandoned bark was left on the felled log for the propagation of predators. Uninfested green bark was peeled and left to dry out on the ground. Again it was considered good entomological practice to leave the abandoned bark on the felled logs so that predators could develop and, also, so that the costs of effective treating could be reduced. To protect the predators hatching in the bark around the root collars and to prevent the stumps from catching fire it was the practice to throw the log away from the stump wherever it was possible to do so. In all cases the bark for about 6 to 10 inches above the root collar was left so that predators, particularly the Clerids, could proprogate. Whenever trees had to be felled in sight of highways and trails the stumps were cut flush with the ground and as much of the damage as possible removed. The practices of cutting low stumps and the removal of debris helped to step up the treating costs but because of National Park Service policy, this extra cost must be

accepted as part of the work of insect control treatment.

Tabulation of treating by each camp

Camp	Species	No. of Trees	Total D.B.H. (In.)	Total Volume (bd.ft.)	Average D.B.H. (In.)	Average Volume (bd.ft.)
A. E. Wood	S.P.	55	3318	328,670	39.0	3,866.6
	P.P.	393	12,332	780,840	31.3	1,986.8
	J.P.	6	164	6,770	27.3	1,128.3
	Total	454	15,410	1,083,780	31.8	2,239.2
Yosemite Valley	S.P.					
	P.P.	8	222	12,790	27.7	1,599.0
	Total	8	222	12,790	27.7	1,599.0
Big Meadows	S.P.	19	712	55,170	37.4	2,903.6
	P.P.	245	5,954	246,720	24.3	1,007.0
	J.P.					
	Total	264	6,666	301,890	26.1	1,143.5
North Crane Creek	S.P.	166	8,028	863,460	48.3	5,201.5
	P.P.	85	2,534	179,390	29.8	2,110.4
	J.P.	12	386	23,490	32.1	1,957.5
	Total	263	10,966	1,066,240	41.7	4,054.1
Ackerson Meadows	S.P.	157	7692	879,740	49.0	5,603.4
	P.P.	353	9,392	478,550	21.8	1,355.6
	J.P.	79	2,216	105,770	28.0	1,351.5
	D.P.	4	72	500	18.0	125.0
	Total	593	12,372	1,464,560	32.6	2,469.7
El Portal	S.P.					
	P.P.	50	1,330	57,760	26.6	1,155.2
	J.P.					
	D.P.					
	Total					
Totals	S.P.	427	19,750	2,127,040	46.2	4,981.3
	P.P.	1,134	31,763	1,756,050	28.0	1,548.5
	J.P.	97	2,766	136,030	28.5	1,402.3
	D.P.	4	72	500	18.0	125.0
	Total-	1,662	54,352	4,019,620	32.7	2,412.5
Yosemite Valley	D.F.	373	10,076	455,990	27.0	1,222.0
	P.P.	5	174	13,020	34.9	2,604.0
	Total	378	10,250	469,010	27.1	1,240.8
		2,040	64,602	4,488,630	31.6	2,200.3

Included in the totals for North Crane Creek are 107 trees with 359,210 board feet treated by the E.C.W. stub camp from camp headquarters at Cascades.

Total Bark Surface Treated and Number of Insects in the Larval and Pupal Stages destroyed . . . . . .

	Ponderosa Pine	Sugar Pine	Jeffrey Pine	Digger Pine	Douglas Fir	Totals
Trees (no.)	1,139	427	97	4	373	2,040
Average D.B.H.	28.0 in.	46.2 in.	28.5 in.	18.0 in.	27.0 in.	31.6 in.
Average Height	120.0 ft.	160.0 ft.	110.0 ft.	40.0 ft.	85.0 ft.	
Total Bark Surface (sq. feet)	678,958	472,962	53,902	644	153,527	1,359,993
No. of Insects in brood	135,791,600	94,592,400	10,780,400	128,800	30,705,400	271,998,600

Conclusions and recommendations.

The per acre loss is considerably less than last year as is evidenced in the following table which includes sections picked at random from the areas under treatment a year ago and again this year. The splendid results indicate what can be done with a very serious situation if time, men and funds are available in the required amounts. Time is one of the most important elements in insect control work. For the longer adequate funds are delayed the higher the costs and the less the chances of successfully combatting the infestation present in the trees. The situation on the areas under treatment is very promising and with the active persecution of insect control activities on the same scale of the past two years the serious situation evident in the summer of 1932 will be eventually come back to normal.

T.4 South, R.21 East	Acres	Spring, 1933 Trees	Spring, 1933 Volume	Spring, 1934 Trees	Spring, 1934 Volume
Section 8	598.00	58	117,010	50	94,930
17	597.64	47	92,360	23	57,560
21	640.00	76	456,820	33	61,110
27	640.00	143	202,050	21	40,160
32	594.00	100	462.510	27	120,810
T.4 South, R. 20 East					
Section 25	640.00	60	274,740	17	48,930
36	400.00	29	112,570	8	16,830
T.2 South, R. 20 East					
Section 26	640.00	4	6,300	25	38,470
27	640.00	16	63,210	37	51,960
34	640.00	60	54,770	68	89,700

T. 1 South, R. 20 East (Cont.d)

	Acres	Spring 1933 Trees	Spring 1933 Volume	Spring 1934 Trees	Spring 1934 Volume
Sec. 7	644.20	83 -	316,140	49 -	184,270
18	646.08	99 -	210,980	46 -	67,530
19	645.00	100 -	193,450	64 -	121,860
29	640.00	71 -	300,730	78 -	194,710
	6,605.[illegible]	926	4,653,640 ft.	540	1,128,830 ft.

The high comparative costs of this control is due to a series of factors the most important of which is the change in the cost of labor. Labor was paid the standard National Industrial Recovery Act scale which in the case of the treaters or loggers amounted to an increase of slightly more than 51% In the case of camp construction the increase of wages is considerably more, amounting in some cases to as much as 100% In the past it has been the practice of constructing camp with the loggers, and the replacement of the loggers with carpenters being paid $1.10 per hour has increased the cost of camp construction at least 100% On top of the increase of the cost of labor it was necessary to construct two entire new camps for winter occupancy. Without doubt the camps constructed were good and very comfortable for winter use and helped make a disagreeable job a little less so. The camps constructed are so situated that any future control projects in the adjacent areas will benefit from their existence. The cost of these camps should be prorated over the coming control projects to properly give credit to this insect control project. As it is they are being charged directly against the project and any future work in this region will be considerably less in the total cost per unit of work.

Transportation costs were increased by approximately 100% due to the addition of a per day repair charge to the rent costs. It is therefore to be expected that as long as funds are supplied by the National Industrial Recovery Administration for insect control projects the cost per unit of work will be considerably more than costs with regular appropriations. As long as it is the intent of the National Industrial Recovery Act to place men to work at good wages insect control activities can help and have helped considerably to relieve the serious unemployment situation existing in the vicinity of Yosemite National Park. Everything was done in the present project to carry out the intent and purposes of the President's commendable relief program. Yosemite National Park can be proud of its work in this program especially with respect to insect control activities as a two-fold purpose was attained, i.e., the placing of much-needed money in quick circulation and a large reduction in the amount of losses from destructive insects.

Relations of the insect control organization with other departments of the Park were of the very best character and considerable help was obtained without any friction. It is strongly recommended that the present system be continued as long as insect control activities are a part of Yosemite National Park's functions.

It is recommended that a sum of $30,000 be made available thru the National Industrial Recovery Administration (or the equivalent sum of $25,000 thru regular appropriations) for the active persecution of the very promising insect control program thruout the coming Fall, Winter and Spring

periods. This fund should be available by the middle of September so that adequate plans and equipment will be ready at the beginning of the fall rainy season.

APPENDIX

Tables of Man-Hours, Costs.

Infestation Concentration Maps.

Ackerson Meadows Insect Control - Spring 1934

Township 1 S., Range 19 E. -- Incidentally all Forest Service Cooperative Territory.

		TREATED.	All that were spotted.
Section 1.....	652.00	35 trees	29,050 feet
12.....	640.00	47	74,420
23.....	320.00	10	36,350
24.....	640.00	25	62,180
25.....	640.00	44	153,810
26.....	470.00	37	134,690
27.....	20.00	10	14,750
35.....	667.72	42	134,800
36.....	901.40	82	118,690
	4,891.12	330 trees	698,350 feet

Township 2 South, Range 19 East -- Forest Service Territory.

Section 3.....	644.36	16 trees	81,400 feet	All trees spotted were treated.
10.....	640.00	9	27,870	
	1,284.36	25 trees	109,270 feet	

Township 1 South, Range 20 East -- Mostly within the Park boundaries.

Section 5.....	485.00	38 trees	(treated) 67,740 ft.	38	(spotted)	67,740 ft.
6.....	632.25	44	74,360	44		74,360
7.....	644.60	49	124,270	49		124,270
8.....	240.00	28	59,390	28		59,390
16.....	160.00	13	31,560	13		31,560
17.....	640.00	23	52,420	23		52,420
18.....	646.80	46	67,630	47		67,630
19.....	645.00	64	121,660	66		123,060
20.....	640.00	72	194,710	73		194,870
21.....	360.00	11	18,260	12		24,310
28.....	300.00	5	31,310	5		31,310
29.....	1640.00	20	117,660	20		117,660
30.....	642.40	28	92,470	38		92,470
31.....	916.12	52	171,400	52		171,400
32.....	936.72	49	116,170	49		116,170
33.....	958.44	30	145,300	39		145,300
	9,454.61	591 trees	1,486,410 ft	596 trees		1,493,910 ft

Township 1 N., Ranges 19 & 20 E. -- Hetch Hetchy -- All within Park boundaries.

Sections, 10; acres, 3040; trees, 66; feet, 68,630.

SUMMARY OF ABOVE

		TREATED		SPOTTED	
T1S, R19E.	9 Secs.	330 trees	728,700 feet	330 trees	728,700 ft
T2S, R19E.	2	25	109,270	25	109,270
T1S, R20E.	18	591	1,486,410	596	1,493,910
T1N, R19-20E.	10	66	68,630	66	68,630
	39 Secs.	1,032 trees	2,393,010 feet	1,032 trees	2,400,510 ft

18,850.09 acres.

North Crane Creek Insect Control - Spring 1934.

Township 3 South, Range 20 East.

Section 5.....20 trees	66,930 feet	641.64 acres	
6.....38	156,360	617.43	
7.....36	153,650	618.98	
8.....12	60,300	640.00	
16..... 4	32,740	40.00	
17.....25	131,800	640.00	
18..... 5	17,470	626.33	
	626,050 feet	3,826.51	

Township 3 South, Range 19 East

Section 1.....64 trees	230,570 feet	641.08 acres	
2.....31	118,930	642.66)	
11.....12	45,110	640.00)	K.C.W.
12..... 7	34,270	640.00)	
13..... 5	10,350	160.00	
119	439,290	2,723.76	

SUMMARY --- North Crane Creek

12 sections -- 250 trees -- 1,065,340 feet -- 6,550.07 acres

In theabove unit an K.C.W. stub camp from Cascades treated 1922.66 acres on which there were 107 trees with 359,810 board feet.

Camp A. E. Wood Insect Control - Spring 1934

Township 4 South, Range 20 East

Section 25.....640.00 acres	17 trees	48,930 feet
36.....400.00	8	16,830
1,040.00 acres	25 trees	65,760 feet

Township 4 South, Range 21 East

Section 4.....320.00	8 trees	11,080 feet
5.....635.01	36	70,300
8.....598.00	50	94,930
9.....370.00	8	10,110
16.....370.00	12	16,940
17.....597.64	23	37,580
20.....600.00	14	25,390
21.....640.00	33	61,110
22.....390.00	13	69,130
28.....430.00	14	24,400
27.....640.00	21	40,160
28.....640.00	15	22,570
29.....595.60	15	11,180
32.....994.00	27	120,810
33.....640.00	14	18,550
34.....640.00	12	25,450
35.....640.00	6	14,810
36.....135.00	10	17,940
9,260.25 acres	336 trees	725,825 feet

Township 5 South, Range 22 East — Within Big Tree Grant

360.00 acres	22 trees	36,390 feet

Township 5 South, Range 21 East

Section 1.....720.60 acres	34 trees	73,480 feet
2.....711.52	20	37,580
3.....434.52	5	7,760
4.....160.00	2	9,780
5.....200.00	5	15,370
2,650.53 acres	62 trees	143,890 feet

Grouse Creek
sample plot.. 80.00 acres — 3 trees — 4,470 feet

Black Rascal
sample plot..100.00 acres — 5 trees — 7,630 feet

Scattered along Wawona
Road.....3000.00 acres — 42 trees — 83,940 feet

SUMMARY WAWONA ROAD

Grand total of 485 trees with 1,067,290 feet, 14,081.78 acres.

Big Meadows Insect Control - Spring 1934

Township 5 South, Range 20 East.

Section 2.....420 acres	34 trees	32,570 feet
3.....640	34	36,980
1,060 acres	68 trees	69,550 feet

Township 2 South, Range 20 East.

Section 25..... 10 acres	1 tree	4,350 feet
26.....640	25	38,470
27.....640	37	51,960
28..... 40	2	1,400
33.....120	10	5,100
34.....640	68	89,700
35.....600	53	41,300
2,730 acres	196 trees	232,340 feet

SUMMARY OF ABOVE

3,810 acres, 264 trees, 301,890 board feet.

Yosemite Valley Insect control - Spring, 1934.
2,700 acres, 8 trees, 12,790 board feet.

El Portal Pocket Insect Control - Spring 1934.
960 acres, 50 trees, 57,760 board feet.

Yosemite Valley Douglas Fir Insect Control - Winter 1933-1934
300 acres 378 trees, 469,010 board feet.

MAN-HOURS OF TREATING

Camp	Foreman	Logger	Laborer	Saw Filer	Head Spotter
			0		
A. E. Wood	104	728	0	0	0
El Portal	8	420	0	0	36
Yosemite Valley	0	125	0	0	0
Big Meadows	308	2018	0	0	0
North Crane Creek	176	1440	0	116	0
Ackerson Meadows	858	7822	0	408	0
Yosemite Valley (Douglas Fir)	836	1003	0	0	0
	2290	13554	0	524	36

TOTALS --

Foreman	$ 2,037.74
Loggers	11,530.90
S. Filer	376.40
Spotter	39.60
	$14,174.64 GRAND TOTAL OF TREATING COSTS.

MAN-HOURS IN TRANSPORTATION AND PROTECTION

Camp	Truck-driver	Fireguard
A. E. Wood	0	0
El Portal	0	0
Yosemite Valley	0	0
Big Meadows	110	40
North Crane Creek	88	16
Ackerson Meadows	225	16
Yosemite Valley (Douglas Fir)	12	0
TOTALS --	435	72

MAN-HOURS ON CAMP CONSTRUCTION

Camp	Foreman	Carpenter	Carp. Helpr	Plumber	Plumb Hlpr.	Laborer	Logger	Spotter	Head Spot.	Truck Driv.
A. E. Wood	0	0	0	0	0	0	0	0	0	0
El Portal	0	0	0	0	0	0	0	0	0	0
Yosemite Valley	0	0	0	0	0	0	0	0	0	0
Big Meadows	60	0	0	0	0	24	110	24	28	8
North Crane Creek	72	352	156	53	16	80	80	43	24	36
Ackerson Meadows	268	448	478	58	10	144	64	0	0	52
Yosemite Valley (Douglas Fir)	0	0	0	0	0	0	0	0	0	0
TOTALS --	400	800	634	111	26	248	194	67	52	96

TABULATION OF AVERAGE COSTS.

Treating costs only	$14,174.64	
Total cost of treating, all categories	31,613.28	
Cost per tree treated, treating costs only	7.33	
Cost per tree treated, all costs	16.45	
Cost per thousand bd.ft. treated, treating costs only	3.44	
Cost per thousand bd.ft. treated, all costs	7.70	
Cost per acre treated, treating costs only	0.30	
Cost per acre treated, all costs	0.70	
Cost per acre protected, treating costs only	0.177	
Cost per acre protected, all costs	0.397	
Cost per man-hour of treating labor	0.864	
Cost per man-hour of all labor		
Cost per tree spotted, spotting costs only	2.06	
Cost per thousand bd.ft. spotted, spotting costs only	0.856	

Number of trees treated per man-hour of treating labor	.11	tree
Volume treated per man-hour of treating labor	251.7	feet
Number of trees treated per man-day (computed from above)	.88	tree
Volume treated per man-day (computed from above)	2013.6	feet

80,000 acres protected.

The Big Oak Flat Road at Gin Flat early in March,1934. It was necessary to plow thru snow as deep as this for the servicing of the insect control camps at North Crane Creek and Ackerson Meadows. Indicative of some of the difficulties encountered during any normal insect control program.

Another view of the insect control camp at Ackerson Meadows. Well and pumping plant on the left; shower house in the center; mess hall on the right. Branch of Ackerson Creek thru the center. Indicative of the work taken for the installation of a comfortable winter camp. Mess hall seats 48 men at one time; No crowding.

Sleeping quarters at the Ackerson Meadows insect control camp. Note the high side-walls which allowed ample head room and eliminated the crowding always present in low-walled tents. Saw-filer's tent on the right. Picture taken in March after snow had left.

Treaters studying the Riker mounts containing exhibits of the insects being combatted in control work. This exhibit was placed in front of the mess hall at Ackerson Meadows. Considerable interest was always present among the men particularly when new species were met with during the treating process.

Treating Digger Pine along the Hetch Hetchy Road. The pine trees along this road underwent a heavy attack of Flathead Borers. This scene was taken early in March and indicates how early the snw left this part of the country. Rattlesnakes were out at this time. Examples of some of the very good Indian fallers employed.

Camp constructed at North Crane Creek astraddle the Big Oak Road. Cook's tent in center; mess tent in right center; sleeping quarters on other side of road. Note the shake roof constructed to protect the kitchen from the deep snowfall. Mess tent seats 36 at one time without any crowding or discomfort.

Treating infested Douglas Fir around Mirror Lake in the middle of February. Note the absence of any snow. At this time treating was hazardous because of the lack of ground moisture, rocky nature of the terrain, and the great heat from the treas. These men are some of our local, regular treaters.

T. 3 S.

T. 4 S.

R. 20 E.

R. 21 E.

N

INFESTATION CONCENTRATION

YOSEMITE NATIONAL PARK
INSECT CONTROL MAP
CHINQUAPIN AREA
MAR 1933

T. 4. S.

T. 4. S.

R. 21 E.

R. 22 E.

INFESTATION CONCENTRATION

YOSEMITE NATIONAL PARK
INSECT CONTROL MAP
WAWONA AREA
MAR 1963.

LEGEND

- Sugar Pine
- x Ponderosa Pine

MT. DIABLO BASE LINE

T.1S.

T.2S.

R.19E.

R.20E.

LEGEND

• Sugar Pine

× Ponderosa Pine

INFESTATION CONCENTRATION

YOSEMITE NATIONAL PARK

INSECT CONTROL MAP

TUOLUMNE GROVE AREA

MAR 1933.

T. 2 S.

T. 3 S.

R. 20 E.

R. 21 E.

N

LEGEND

• - Sugar Pine

x - Ponderosa Pine

INFESTATION CONCENTRATION

YOSEMITE NATIONAL PARK

INSECT CONTROL MAP

BIG MEADOW AREA

1928 - 1931

PORTION OF WAWONA ROAD

1934

13 17 16

24 20 21

T. 3 S.

25 29 28

PARK BOUNDARY

36 32 33

N

1 5 4

12 8 9

T. 4 S.

13 17 16

R. 20 E. R. 21 E.

INFESTATION CONCENTRATION
YOSEMITE NATIONAL PARK
INSECT CONTROL MAP
CHINQUAPIN AREA
Nov. 1933. ~ April 1934.

LEGEND

- • Sugar Pine
- x Ponderosa Pine

MOUNT DIABLO BASE LINE

T. 1 S.

T. 2 S.

R. 19 E.

R. 20 E.

LEGEND
- Sugar Pine.
x Ponderosa Pine.

INFESTATION CONCENTRATION

YOSEMITE NATIONAL PARK

INSECT CONTROL MAP

Ackerson Meadows Area

Nov. 1933. – April 1934.

T. 2 S.

T. 3 S.

R. 20 E.

R. 21 E.

LEGEND

• Sugar Pine

x Ponderosa Pine

INFESTATION
CONCENTRATION

YOSEMITE NATIONAL PARK
INSECT CONTROL MAP
BIG MEADOW AREA
Nov. 1933 — April 1934.

24 20 21 22 23 24 19 20

25 29 28 27 26 25 30 29

T. 4. S.

T. 4. S.

MARIPOSA
MADERA

36 32 33 34 35 36 31 32

FIRST STANDARD PARALLEL SOUTH

6 5 4 3 2 1

PARK BOUNDARY

WAWONA PT.

7 8 9 10 11 12 8

RANGER STA.

PARK BOUNDARY

N

R. 21 E.

R. 22 E.

LEGEND
• Sugar Pine
x Ponderosa Pine.

INFESTATION CONCENTRATION

YOSEMITE NATIONAL PARK
INSECT CONTROL MAP
WAWONA AREA
Nov. 1933 — April 1934